Broadway Boulevard, Euclid to Country Club

DRAFT

PERFORMANCE MEASURE DEFINITIONS AND ASSESSMENT METHODOLOGY

July 18, 2013

Overarching Assumptions:

- The improved Broadway Boulevard will be a walkable complete street; per the project Vision—maintain and improve the provision of affordable, efficient, and sustainable transportation choices serving local and regional transportation needs for walking, bicycling, transit, and vehicles.
- For all new design options, assumption is a 30 to 35 mph design speed and posted speed with the street designed to encourage vehicles to travel at the design speed in support of the project Vision.

Performance Measure Methodology	Cross Section Elements that Affect Performance Assessment	What Element or Combination of Elements is Assessed		
		Lane Configuration Type	Street Cross Section Elements	Street Cross Section
1. Pedestrian Access and Mobility				
1a. Functionality of Streetside for Pedestrian Activity: Degree to which there is enough width to support desired pedestrian activity, landscaping, street furnishings and other improvements. ▪ Sidewalk width and the width of the buffer area between the sidewalk and the roadway are key factors for the comfort and functionality of a street for pedestrians. ▪ The ITE Walkable Urban Thoroughfares Manual provides guidance for design of major urban streets like Broadway. The transportation characteristics of Broadway (i.e.; speed and number of lanes) make it a Boulevard Street type as defined by the manual (25-35 mph with 4-6 lanes, for various context types, see document for definitions). The current and potential character of the context along Broadway are defined as C-4 General Urban areas and C-3 Suburban areas in the manual. The combination of street type and context type lead to the guidance for sidewalk width: ○ C-4 with predominantly commercial ground floor – 1.5 ft. edge, 7 ft. furnishings (including landscape), 8 ft. throughway, 2.5 ft. frontage ○ C-4 with predominantly residential ground floor – 1.5 ft. edge, 8 ft. furnishings (including landscape), 8 ft. throughway, 0 to 1.5 ft. frontage ○ C-3 with predominantly commercial ground floor – 1.5 ft. edge, 7 ft. furnishings (including landscape), 6 ft. throughway, 1.5 ft. frontage ○ C-3 with predominantly residential ground floor – 1.5 ft. edge, 8 ft. furnishings (including landscape), 6 ft. throughway, 0 to 1.5 ft. frontage ▪ Result of guidance in relation to Broadway is for a 9.5 ft.-wide landscape area and 8 ft. sidewalk. Assume that additional sidewalk width if needed would be part of private development; the assessment compares the range of possible pedestrian improvements to this guidance.	▪ Sidewalk width ▪ Buffer width		Sidewalk and Landscape Cards	
1b. Separation from Vehicular Traffic: Width and design character of area between outside edge of vehicle lane and sidewalk. ▪ Guidance/factors include ITE Manual guidance for buffer width; Multi-modal level of service considerations for presence and frequency of street trees and other landscaping within buffer which varies depending on design of street elements; and speed and volume of traffic (assumed to be relatively constant). The potential to include buffered bicycle lanes could also increase the buffer distance perceptibly.	▪ Sidewalk width ▪ Buffer width ▪ Landscape within buffer ▪ Trees or shade structures		Sidewalk and Landscape Cards	
1c. Pedestrian-oriented Facilities or Improvements: Extent of shade, lighting, seating, drinking fountains and other features to serve pedestrian needs and provide for visual interest. ▪ Factors include percentage of shade, lighting levels and consistency, number and frequency of other pedestrian supportive design features (i.e.; seating, drinking fountains).	▪ Sidewalk width ▪ Buffer width ▪ Trees or shade structures		Sidewalk and Landscape Cards	
1d. Walkable Network/Neighborhood Connections: Ability for pedestrians to access neighborhoods and pedestrian network. ▪ Factors include number, length between, and quality of connections from Broadway to surrounding pedestrian network ▪ This measure cannot currently be assessed, because connections from Broadway and the pedestrian network are not included in the current level of design	None, not measurable at current level of design			

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1e. Pedestrian Crossings: Ease of crossing Broadway and side streets intersecting with Broadway on foot. ▪ Assume that the number of crossings is equal (except that existing conditions would have fewer than any future option). Therefore the current assessment is about the quality and distance of the crossing. ▪ As design is developed further and intersection designs are developed the ease of crossing side streets can be assessed.	▪ Vehicle and transit lane number and width ▪ Bicycle lane width ▪ Presence, frequency, and width of median	Range based on width from outside curb to outside curb and median presence, frequency, and width		
1f. Vehicle / Pedestrian Conflicts at Driveways: Degree to which conflicts between pedestrians and vehicles exist at driveways for site access; strongly related to Performance Measure 2b. ▪ Factors include level pedestrian crossing of driveway; vehicle speed; frequency of driveways; and visibility of the pedestrian on the sidewalk (measured by distance from right travel lane to sidewalk).	▪ Buffer width ▪ Bicycle lane width		Sidewalk and Landscape (Range for bike lane width)	
1g. Universal Design: Provision of access and mobility for people of all ages and abilities using design elements that go beyond base requirements of disabled access per the Americans with Disabilities Act (ADA) federal design requirements. ▪ Many factors that are not defined at current level of design will come into play in this assessment, such as: ○ Intersection and signal design ○ Type and design of pedestrian facilities ○ Design of transit facilities ○ Wayfinding signs ▪ At current level of design, sidewalk width more than ADA minimum is an indicator of potential for universal design.	▪ Sidewalk width			
1h. Walkable Destinations: Presence and access to jobs, homes, shopping, etc.; and presence of sufficient density of other uses and access from other uses to support market for employment, shopping, etc. ▪ Many factors that are not defined at current level of design will come into play in this assessment, such as: ○ 1d. Walkable Network/Neighborhood Connections: This measures the performance of alternative designs' ability to create the necessary infrastructure to encourage walking to destinations. This infrastructure will then support the market potential for businesses that people would want to walk to on Broadway. ○ Economic Vitality performance measures related to potential for jobs, commercial uses, and homes along Broadway. ▪ Measured by determining density of households and jobs within walkable distance of uses along Broadway.	None, not measurable at current level of design			
1i. Ease of Transition to Walking: Measure of the ability of users of other transportation modes to become pedestrians along Broadway. ▪ Many factors that are not defined at current level of design are needed to assess this measure, including: ○ Proximity and number of parking lots ○ Proximity and number of bicycle parking/lockers ○ Number of bus stops/transit stations ○ Number and type of comfort and safety features (lighting, seats, shade) ○ Number of attractions/commercial uses ▪ Measure by determining the number and distance related to above factors.	None, not measurable at current level of design			
2. Bicycle Access and Mobility				
2a. Separation of Bikes and Arterial Traffic: Degree to which the street design elements allow separation of cyclists from vehicular traffic. ▪ Greater separation is a factor related to bicyclist safety and comfort, and therefore likely bicycle use of Broadway. ▪ The main factor in this performance measure is the width of the bicycle lane. ▪ The following guidance is based on traffic speeds of 35 mph or less: ○ 5 ft. width negative (–) ○ 6 ft. width neutral (ITE Manual recommendation) ○ 7 ft. width positive (+) ○ 7 to 9 ft. width buffered bike lane positive (+ to ++)	▪ Bicycle lane width		Bike Lane	

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2b. Bike Conflicts with Crossing Vehicles: The frequency of points where vehicles cross the bike lane and the ability of the street design to mitigate those potential conflicts. ▪ Assume all future options have ○ a base assessment that ranges from one negative to one positive (- to +) for vehicles crossing bike lane to get to curb cuts, because there is uncertainty regarding how quickly an access management policy can reduce the number of site access curb cuts/driveways along Broadway. ○ Have the potential for dedicated right turn lanes, green pavement treatments and other markings to be provided at intersections to enhance safety, ○ Vehicle speeds are assumed to be equal in all cross sections. ▪ Options that require buses to cross over to bus pull outs are neutral. ▪ Options with dedicated transit lanes in the middle get a single + for that, still would have local buses pulling into bus pull outs.	▪ Dedicated transit lane location		Center vs. Side Running Dedicated Transit	
2c. Pavement Condition: The smoothness of the street's pavement initially and over time. ▪ Smooth pavement is a priority for bicyclist comfort. ▪ Factors in addition to pavement type include: ○ gutter design ○ type of plants that are in the landscape. ▪ Pavement type is not dependent on cross section design and therefor cannot be measured at the current level of design.	None, not measurable at current level of design			
2d. Bike Facility Improvements: Extent of bike racks, shade, drinking fountains, green pavement (bike boxes, etc.) and other features to serve bicyclists' needs. ▪ Factors include percentage of shade; use of bike boxes and other features; number and frequency of bike racks; drinking fountains; and other bicycle-supportive design features. ▪ All design concepts will utilize bike boxes and green and other special paving markings as allowed by code. ▪ At current level of design ranking is most affected by presence of trees or shade structures and the width of the sidewalk and buffer area to accommodate bicycle supportive facilities.	▪ Sidewalk width ▪ Buffer width ▪ Trees or shade structures		Sidewalk and Landscape	
2e. Bike Network Connections: Convenience and safety of access to surrounding bike network. ▪ Factors include: Number, length between, and quality of connections from Broadway to surrounding bicycle network ▪ Quality of movement along Broadway to connections is assessed in 2a. Separation of Bikes and Arterial Traffic, 2b. Bike Conflicts with Crossing Traffic ▪ Need to know relationship of bicycle crossings to adjacent bicycle network, see Bike Crossings (this cannot be assessed at current level of design)	None, not measurable at current level of design			
2f. Bicycle Corridor Travel Time: The time it takes for average and advanced bicyclists to travel the length of Broadway. ▪ Need further design details, including – signal and intersection design, alignment, access management design, transit stop locations, etc. in order to assess using VISSIM transportation simulation model.	None, not measurable at current level of design			
2g. Bike Crossing: Convenience and quality of bicycle crossings of Broadway and side streets intersecting with Broadway. ▪ Assume some basic improvements at crossings and more crossings for all concept options, so this gives: ○ Four lane options 1 plus; ○ Six lane options 1 plus (regardless of median width as street crossings will likely be at least 18 ft. wide given turn lane and 7 ft. refuge island width); and ○ Eight lane options a neutral, except for 6+T B given its large width. ▪ As design is developed further and intersection designs are developed the ease of crossing side streets can be assessed.	▪ Vehicle and transit lane number and width ▪ Bicycle lane width ▪ Median presence and width	Range based on width from outside curb to outside curb		
3. Transit Access and Mobility				
3a. Distance to Transit: Number and location of transit stops and the number of households, jobs, and services within walking distance has an relationship to transit ridership ▪ Factors include: Number of households, jobs, and square feet of commercial use within walking distance of transit stops; and 1d. Walkable Network/Neighborhood Connections, 1h. Walkable Destinations, and several non-transportation performance measures. ▪ Cannot be assessed at current level of design as transportation factors require alignment and crossing design, and non-transportation factors are related to future land use.	None, not measurable at current level of design			

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3b. Transit Stop Facilities: Design qualities of transit stops for comfort and safety of riders and to support improved aesthetics and community character. ▪ Factors include: Percentage of shade; lighting levels and consistency; and number and frequency of other design features (e.g.; drinking fountains, off-bus ticket machines, next bus information signs, wayfinding information, etc.). ▪ Existing facilities are generally poor, although there are a few bus pull outs. ▪ Four lanes get ○ when have pull outs (except those with wider pedestrian areas get +) because of lower construction cost may be more budget to improve transit stops; SATA also gets a + because of transit platforms for streetcar. ▪ Six lanes get neutral with pull outs as this is now the regional standard. ▪ BRT in middle of roadway gets ++ because it is assumed that this investment in roadway infrastructure for BRT would mean commitment to high-level of improvements on the platforms.	▪ Sidewalk width ▪ Buffer width ▪ Trees or shade structures ▪ Dedicated transit lanes	Presence and location of dedicated transit lanes (range for Sidewalk and Landscape width for side running dedicated transit and no dedicated transit)	Range for Sidewalk and Landscape width for side running dedicated transit and no dedicated transit	
3c. Transit Corridor Travel Time: The time it takes to travel the length of the Broadway project by transit. ▪ Existing corridor travel time is lower than existing vehicular traffic travel time, so two negatives rather than the one negative for 4a. Movement of Through Traffic. ▪ Four and six lanes with pull outs, signal prioritization, etc. are assumed to be slower than vehicular movement, because all buses must pull into bus pull outs and this slows the bus travel time. ▪ Dedicated transit lanes with accompanying signal prioritization, etc. are assumed to have roughly the same corridor travel time as vehicles, except for where the dedicated lane is outside lane (Option 6+TA), because it would have issues with right turning vehicles and the BRT may need to use the bus pullouts. Also, SATA is one minus sign less than the vehicular through movement performance measure because at least a portion of the service is in a dedicated lane. ▪ VISSIM results accounting for signal timing, transit priority treatments, traffic delay, merges, and boarding time at transit stops ▪ Initial assessment based on traffic assessment of current PAG projections and 30% reduced traffic growth option, with qualitative comparisons based on professional experience and judgment of relationship between transit and vehicular travel time ▪ Transit priority treatment at intersections, level boarding, off-vehicle ticketing, etc. are considered to be more likely with dedicated transit lanes	▪ Dedicated transit lanes presence and location (i.e.; side or center running) ▪ Bus pullouts ▪ Vehicular lane number	Presence and location of dedicated transit lanes and number of traffic lanes		
3d. Schedule Adherence: The extent that transit is able to stay on schedule. ▪ Dependability of travel time along the corridor can be measured to a degree with VISSIM. ▪ This measure is a rough combining of 3b and 3c with a slightly more weight to 3c. ▪ Dependent on factors that are not controllable as part of this project, including Sun Trans scheduling and transit driver behavior.	▪ Dedicated transit lanes presence and location (i.e.; side or center running) ▪ Bus pullouts ▪ Vehicular lane number	Presence and location of dedicated transit lanes and number of traffic lanes		
3e. Frequency and Hours of Service: The frequency at which transit service stops along Broadway and for what period of week and weekend days. ▪ Potential that service efficiencies related to other transit performance measures could allow for increase of service for minimal additional cost. ▪ This is mainly an independent decision that Sun Trans would make that cannot be influenced to much a degree by this project.	None, not influenced by this project to a meaningful degree			
3f. Accommodation of Future High Capacity Transit: The ability of the roadway and roadside design to accommodate future high capacity transit. This can ultimately improve performance of design concepts in relation to other transit performance measures. ▪ Existing and 4 lanes get – because they would end up having one lane in each direction for vehicular traffic if dedicated transit lanes were provided. ▪ Six lane options get – because even though these could be converted to 4+T with dedication of lanes, there would likely be resistance to reducing traffic lanes once they are in place and construction would need to occur to make the conversation. ▪ 6+T A has right turning vehicle issues so ++ ▪ 4+T and 6+T B gets +++, because they provide for high-quality high capacity transit with implementation of the concept ▪ SATA is rated neutral because only one direction is in a dedicated lane while the service levels are reduced by the other direction running in a shared lane.	▪ Dedicated transit lanes ▪ Median width (wide enough to allow future flexibility) ▪ Vehicular lane number (ability to convert to dedicated transit in the future)	Presence and location of dedicated transit lanes and number of traffic lanes		
3g. Riders per Vehicle: Average number of daily riders per transit vehicle or per peak hour transit vehicle. ▪ VISSIM modeling and transit service assumptions ▪ Other transit performance measures effect transit ridership and efficiency of service ▪ Affected by Sun Trans service planning which is not controlled by this project	None, not measurable at current level of design			

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4. Vehicular Access and Mobility				
4a. Movement of Through Traffic During Peak Traffic Periods: Effectiveness of moving through vehicular traffic, which affects a variety of other transportation, environment, and economic factors. ▪ Existing section with current volumes - impacts of buses stopping in through lanes and high number of ped HAWK signals (that are not synchronized with other signals), through traffic flow is less than desirable; increased traffic demand for either growth scenario without adding intersection capacity will result in long travel times and excessive delay. ▪ 4 lane options w/o exclusive transit lanes – do not provide sufficient through capacity at the signalized intersections for either growth scenario. These options assume that additional turning lanes are provided at the key intersections (Euclid, Campbell, Country Club) and bus pullouts and coordinated pedestrian HAWK signals are provided. ▪ 4-lane options with exclusive transit lanes – through traffic operations will be improved assuming that a sufficient modal shift from car to transit (BRT) occurs to reduce vehicular demand. ▪ 6 lane options w/o exclusive transit lanes – fair to good through traffic operations depending upon growth scenario; assumed bus pull outs and coordinated pedestrian HAWK signals. ▪ 6 lane options with exclusive transit lanes – good to very good through traffic operations depending upon growth scenario and assuming that a sufficient modal shift from car to transit (BRT) occurs to reduce vehicular demand. ▪ The SATA concept is rated lower than the 4 lane mixed flow options because the streetcar shared lanes are estimated to reduce performance for those lanes. ▪ Design details that will be developed later in the project (i.e.; intersection and signal design, access management, etc.) will allow assessment using VISSIM which will allow for quantitative measurement of: ○ Average corridor travel time ○ Average speed ○ Average 95 percentile queue length ○ Average delay Average corridor travel time ○ Volume to Capacity Ratio (V/C) ○ Travel time reliability ▪ Initial assessment based on assessment of current PAG projections and 30% reduced traffic growth option, with qualitative comparisons based on professional experience and judgment	▪ Vehicular lane number ▪ Dedicated transit lanes presence and location (i.e.; side or center running)	Number of traffic lanes and presence of dedicated transit lanes		
4b. Intersection Delay – Overall Intersection Performance: Overall delay for vehicular traffic on Broadway and cross streets at intersections. ▪ Design details that will be developed later in the project will allow assessment using VISSIM: ○ Number of through and turn lanes ○ Length of turn lanes ○ Signal design, including crossing time considerations for pedestrians and bicycles ○ Transit priority treatments ○ Other intersection design features	Not measurable at current level of design ▪ Vehicular lane number			
4c. Intersection Delay – Worst Movement: Worst delay for a single vehicular movement on Broadway or cross streets at intersections. ▪ Design details that will be developed later in the project will allow assessment using VISSIM, see 4b.	Not measurable at current level of design ▪ Vehicular lane number			
4d. Accident Potential: Degree to which street design could affect the potential for accidents. ▪ Certain factors can contribute to higher accident rates and severity of accidents. These can include the following factors, which are not determined at current level of design: ○ Number of access points to adjacent properties ○ Number of side street access points ○ Lane continuity (4e) ○ Amount of bike lane cross over length	None, not measurable at current level of design			
4e. Lane Continuity: The degree to which the number of lanes in the roadway is consistent. The number of lanes can be increased and decreased along the length of a street to reflect different traffic needs at different locations, but merging reduces capacity more than just the lane reduction and can increase the potential for crashes where the merge occurs. ▪ Requires more detailed design in order to perform VISSIM analysis ▪ Comparisons can be made to similar lane reductions in Tucson to evaluate potential for crashes.	None, not measurable at current level of design			

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4f. Access Management for Adjacent Properties: The reduction of number and size of driveway and street access from Broadway. ▪ Access management can improve traffic flow and traffic safety, reduce conflicts with pedestrians and bicycles, and generally reduce potential for accidents. ▪ Needs more detailed design.	None, not measurable at current level of design			
5. Person Access and Mobility				
5a. Person Trips for multiple measures: Multi-modal measures allowing evaluations on a per person basis. ▪ A range of transportation measures can be estimated by person-trips. ▪ Performance for different modes is measures using VISSIM analysis and converted to person trips for measures, including: ○ Corridor travel time ○ Average delay ○ Travel time reliability ○ Other measures as appropriate	None, not measurable at current level of design			
6. Sense of Place				
6a. Historic Resources: Number of historic structures lost due to direct impact and loss of usefulness resulting from parking, setback, site access and other conditions. ▪ Based on review of relationship to future ROW to existing ROW and distance between building facades.	▪ Total future right of way width	Range based on range of total right of way width		
6b. Significant Resources: Number of significant structures lost due to direct impact and loss of usefulness resulting from parking, setback, site access and other conditions. ▪ Based on review of relationship to future ROW to existing ROW and distance between building facades.	▪ Total future right of way width	Range based on range of total right of way width		
6c. Visual Quality: Ability of the street design to enhance the visual quality along it, including its relationship and impacts to the existing and future visual character of adjacent uses. ▪ Factors related to street design character: ○ Design of median and streetside landscaping ○ Number and location of placemaking features (including public art, wayfinding, lighting, furniture, etc.) ○ Width of roadside areas for streetscape elements and landscaping ▪ Factors related to character of adjacent uses: ○ Relationship to adjacent uses is difficult to predict at this point as don't know the future condition of context at current level of design	▪ Buffer width ▪ Landscape within buffer			Assessment requires full cross section to allow for understanding of the relationship of landscape, pavement area, and total width of the street
6d. Broadway as a Destination: Provision of civic space, visual quality, visibility of uses, and multi-modal access that supports Broadway and the uses along it as a destination within the community. ▪ Factors and/or related measures include: ○ 6c. Visual Quality ○ A balance of all access and mobility measures ○ 7a. Change in Economic Potential ○ 7i. Business Impacts	▪ Buffer width ▪ Landscape within buffer ▪ Relationship to adjacent uses is difficult to predict at this point as don't know the future condition of context at current level of design ▪ Not measurable at current level of design			
6e. Gateway to Downtown: Visual quality, ease of mobility, and similar features that improve connection to downtown. How does Broadway function as a place, in terms of visual quality, and as a transportation connection to downtown? ▪ Combination of 2. Bicycle, 3. Transit, and 4. Vehicular Access and Mobility ▪ 6c. Visual Quality (at current level of design this is a measure of the visual quality of the street) ▪ 6g. Walkable Community ▪ Relationship to adjacent uses is difficult to predict at this point as don't know the future condition of context at current level of design ▪ Given the importance of future adjacent use to the assessment of this performance measure and the inability to adequately understand the potential for future use, this performance measure cannot be assessed at this time.	▪ Sidewalk width ▪ Buffer width ▪ Landscape within buffer ▪ Trees or shade structures ▪ Dedicated transit lanes presence and location (i.e.; side or center running) ▪ Bus pullouts ▪ Vehicular lane number ▪ Median width (wide enough to allow future flexibility) ▪ Vehicular lane number (ability to convert to dedicated transit in the future)			

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6f. Conduciveness to Business: Attractiveness of buildings along Broadway and the general community character as it relates to businesses. ▪ Factors and/or related measures include: ○ 6c. Visual Quality is related ○ 6g. Walkable Community ○ 7a. Change in Economic Potential ○ Site access and parking ○ Site revitalization and reuse ○ Other factors to be determined	▪ Buffer width ▪ Landscape within buffer ▪ Relationship to adjacent uses is difficult to predict at this point as don't know the future condition of context at current level of design ▪ Not measurable at current level of design			
6g. Walkable Community: The degree to which street improvements put a mix of land uses within walking distance of a maximum number of residences and workers. ▪ Factors and related measures include: ○ 1. Pedestrian Access and Mobility ○ 7f. Land Use Mix ○ 8a. Change in Economic Potential ▪ Given the importance of future adjacent use to the assessment of this performance measure and the inability to adequately understand the potential for future use, this performance measure cannot be assessed at this time.	▪ Sidewalk width ▪ Buffer width ▪ Landscape within buffer ▪ Trees or shade structures ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Width of bicycle lanes ▪ Median presence and width			
7. Environment and Public Health				
7a. Greenhouse Gases: Use of design features that can reduce emissions of CO_2, a green house gas that contributes to global warming. ▪ Reduction of vehicle trips and vehicle miles travelled. ○ 1. Pedestrian Access and Mobility ○ 2. Bicycle Access and Mobility ○ 3. Transit Access and Mobility ○ 6g. Walkable Community ▪ Level of congestion. ○ Average vehicular speed ○ Average vehicular delay ○ 4b. Intersection Delay – Overall Intersection Performance ▪ Quality of vehicle fleet, fuel, etc. (cannot be directly influenced by the Broadway project) ▪ Many of these related performance measures cannot be assessed at the current level of design.	▪ Sidewalk width ▪ Buffer width ▪ Landscape within buffer ▪ Trees or shade structures ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Dedicated transit lanes presence and location (i.e.; side or center running) ▪ Bus pullouts ▪ Presence and width of median ▪ Median width (wide enough to allow future flexibility) ▪ Not measurable at current level of design ▪ Ability to convert travel lanes to dedicated transit in the future			
7b. Other Tailpipe Emissions: Use of design features that can reduce particulates and other tailpipe emissions, which can affect public health in areas adjacent to Broadway. ▪ Reduction of vehicle trips and vehicle miles travelled. ○ 1. Pedestrian Access and Mobility ○ 2. Bicycle Access and Mobility ○ 3. Transit Access and Mobility ○ 6g. Walkable Community ▪ Level of congestion. ○ Average vehicular speed ○ Average vehicular delay ○ 4b. Intersection Delay – Overall Intersection Performance ▪ Quality of vehicle fleet, fuel, etc. (cannot be directly influenced by the Broadway project) ▪ Many of these related performance measures cannot be assessed at the current level of design.	▪ Sidewalk width ▪ Buffer width ▪ Landscape within buffer ▪ Trees or shade structures ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Dedicated transit lanes presence and location (i.e.; side or center running) ▪ Bus pullouts ▪ Presence and width of median ▪ Median width (wide enough to allow future flexibility) ▪ Not measurable at current level of design ▪ Ability to convert travel lanes to dedicated transit in the future			

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7c. Heat Island: Use of shade and other design features of the improvements to Broadway that can reduce the heat created by the sun shining on Broadways road pavement and sidewalks. ▪ The solar heat gains to pavement can increase the temperature of the street and surrounding area which can have detrimental environmental and public health effects. ▪ Factors include: ○ Change in amount of pavement ○ Amount of shaded pavement and other areas that can hold heat ○ Proportion of shaded pavement ○ For this assessment it is assumed that there will be an effort to select construction materials for street and sidewalk pavement, as well as gravel/crushed stone for landscaped areas that are "cooler" and would reduce the heat island effect compared to existing materials used along Broadway ▪ For initial assessment the following approach has been taken: Assume existing condition is the base "neutral" condition. Slight penalty for more R.O.W. paving with assumption that much of existing area outside of R.O.W. is hardscaped and that new paving could be high albedo (*albedo* is defined as the ability of a surface to reflect solar energy, high albedo does not necessarily correspond to high reflectance of visible light); increased positive assessment for trees and shade structures, and any proportional differences in shade.	▪ Vehicular and transit lane number and width ▪ Sidewalk width ▪ Presence and type of street trees and shade structures			Combination of pavement vs. landscaped area and size and extent of trees
7d. Water Harvesting and Green Streets Stormwater Management: The degree to which the roadway is graded to drain stormwater into landscaped areas where its flow rate can be reduced, its water quality improved, and it can provide irrigation for the plants in the landscaped areas. ▪ TDOT has recently adopted an Active Practice Guidelines for Green Streets which sets guidance for the design of water harvesting and green stormwater management of streets in Tucson. ▪ For initial assessment the following approach has been taken: Ratio of landscaped to pavement width.	▪ Sidewalk width ▪ Buffer width ▪ Vehicular and transit lane number and width			Combination of pavement vs. landscaped area
7e. Health Benefits of Changes in Walking and Biking (renamed and defined Walkability/Bikeability): The degree to which design elements of the Broadway improvements can support increases in the number and length of walking and biking trips, and walking and biking have a positive impact on public health. ▪ For initial assessment the following approach has been taken: Combined consideration of 1. Pedestrian and 2. Bicycle Access and Mobility performance measures given that this infrastructure is necessary to support the choice of walking and biking regardless of future land use conditions. In future assessments of more developed designs, this performance measure will be combined with 6g. Walkable Community.	▪ Sidewalk width ▪ Buffer width ▪ Landscape within buffer ▪ Trees or shade structures ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Center dedicated transit lanes ▪ Width of bicycle lanes ▪ Median presence and width		Sidewalk and Landscape (Range Based on bicycle lane width associated assessments)	
7f. Land Use Mix: The degree to which improvements to Broadway enable properties along the street to accommodate mixed use development in the future. ▪ Mixing of uses can help support transit ridership, walking, and bicycling, as well as reductions in vehicle miles traveled. ▪ Factors that are under the control of this project include: ○ Number of parcels and size of parcels that can accommodate a mix of land uses in the future, once improvements (i.e.; widening) are made to Broadway (the current level of design does not allow for evaluation of the ability of properties that remain after widening to accommodate development). ▪ Factors that are not within the control of this project include: ○ Extent that existing or possible future zoning allows for viable mixed use development along Broadway ▪ Related performance measures include: ○ 8a. Change in Economic Potential ○ 8e. Business Impacts	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Not measurable at current level of design			

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7g. Affordability: Impact of the design of Broadway on the combination of transportation and housing costs and access to jobs are major contributors to a household's ability to afford to live in a location. ▪ The design of improvements to Broadway could have some impact on transportation costs and access to jobs. ▪ Related performance measures include: ○ 1. Pedestrian, 2. Bicycle, and 3. Transit Access and Mobility ○ 6g. Walkable Community Design + Architecture ○ 8f. Job Impacts (the current level of design does not allow for the level of assessment of positive and negative impacts to businesses to be evaluated fully in relation to job impacts) ▪ Several of the related performance measures cannot be assessed at the current level of design.	▪ Sidewalk width ▪ Buffer width ▪ Landscape within buffer ▪ Trees or shade structures ▪ Bicycle lane width ▪ Vehicle and transit lane number and width (ability to convert vehicular lane to dedicated transit in the future) ▪ Dedicated transit lanes presence and location (i.e.; side or center running) ▪ Bus pullouts ▪ Median presence and width(wide enough to allow future flexibility) ▪ Not measurable at current level of design			
8. Economic Vitality				
8a. Change in Economic Potential: Suitability of parcels along Broadway to provide for current commercial or residential use, repurposed, or adaptive reuse, or to provide future mix of commercial and residential uses, and open space. ▪ Impacts of Broadway improvements to parking, access, and buildings all affect viability of existing businesses and potential for future development. ▪ While cross section width is an indicator of negative impact on existing businesses, in some cases reuse of remnant parcels may have more economic potential than existing development. ▪ Not able to fully assess potential for future development and revitalization of existing buildings at current level of design and planning (need alignments and intersection designs to understand full right of way impacts). ▪ Real estate and business market potential also needs to be assessed. ▪ Assessment Methodology at current level of design for Long Term Economic Vitality Potential (6 or more years after construction of Broadway Improvements): Based on the following assumptions an estimate of % of street fronting property that would not be developable (i.e.; would be open space or district parking) can be roughly estimated: ○ Reduce potential for acquisition by avoiding land acquisition and/or impact to parking on one side of the street. ○ A parcel with 65 foot depth can be reused for development ▪ 130' R.O.W. – West and east of Campbell Avenue less than 5% of street frontage would be district parking or open space (-- to ++) ▪ 150' R.O.W. – West of Campbell about 10% and to the east about 8% of street frontage would be district parking or open space (--- to ++) ▪ 160' R.O.W. – West of Campbell about 25% and to the east about 8% of street frontage would be district parking or open space (--- to ++) ▪ 170' R.O.W. – West of Campbell about 30% and to the east about 15% of street frontage would be district parking or open space (--- to +) ▪ Assessment Methodology at current level of design for Short Term Economic Vitality Potential (up to 5 years after construction of Broadway improvements): Based on the following assumptions an estimate of % of street fronting property that would have a building directly impacted (i.e.; economic vitality would rely on reuse of the property) can be roughly estimated: ○ Reduce potential for acquisition by avoiding land acquisition and/or impact to parking on one side of the street ▪ 80' R.O.W. – West of Campbell likely no buildings impacted and to the east about 5% would likely be impacted ▪ 90-100' R.O.W. – West of Campbell likely 25% of buildings impacted and to the east about 10% would likely be impacted (○) ▪ 105-120' R.O.W. – West of Campbell likely 50% of buildings impacted and to the east about 20% would likely be impacted (-) ▪ 125-135' R.O.W. – West of Campbell likely 50% of buildings impacted and to the east about 35% would likely be impacted (--) ▪ 140-165' R.O.W. – West of Campbell likely 50% of buildings impacted and to the east about 45% would likely be impacted (---)	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts (if extend beyond back of sidewalk)	Based on right-of-way range of types		

Performance Measure Methodology	Cross Section Elements that Affect Performance Assessment	What Element or Combination of Elements is Assessed		
		Lane Configuration Type	Street Cross Section Elements	Street Cross Section
8b. Change in Business Revenue: Comparison of estimate of business revenue today with future conditions considering both potential negative and positive impacts of the improvement project. ▪ Estimate potential loss of business activity from impacts of right of way widening on properties on parking, access, and buildings. ▪ Estimate potential increase in business activity from improved mobility and access along Broadway. ▪ Estimated potential increase in business activity from new businesses, revitalization, and reuse of properties. ▪ Not able to assess at current level of planning, because business revenues are not known, and potential impacts are not know at enough detail to assess which properties might be impacted.	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts (if extend beyond back of sidewalk) ▪ Not measurable at current level of design			
8c. Change in Sales Tax Revenue: Comparison of existing sales tax generated by businesses along Broadway with estimate of future sales tax generation considering both potential negative and positive impacts of the improvement project. ▪ Estimate potential loss of business activity from impacts of right of way widening on properties on parking, access, and buildings. ▪ Estimate potential increase in business activity from improved mobility and access along Broadway. ▪ Estimated potential increase in business activity from new businesses, revitalization, and reuse of properties. ▪ Estimate of potential change in use from sales tax generating to other commercial or residential activity. ▪ Not able to assess at current level of planning, because sales tax revenues are not known, and potential impacts are not know at enough detail to assess which properties might be impacted.	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts (if extend beyond back of sidewalk) ▪ Not measurable at current level of design			
8d. Change in Property Tax Revenue: Comparison of existing property tax generated by properties along Broadway with estimate of future property tax generation considering both potential negative and positive impacts of the improvement project. ▪ Estimate of potential reduction in land area that is taxable, also potential for some increase in taxable property as City sells any remnants of properties that are already owned by the City. ▪ Estimate of potential land and building value increases do the increased vitality of Broadway, and reinvestment in existing and new buildings and other improvements. ▪ Not able to assess impacts from right of way as alignment and intersection design are not determined. ▪ Not able to assess at current level of planning, because property tax revenues are not known, and potential impacts are not know at enough detail to assess which properties might be impacted.	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts (if extend beyond back of sidewalk) ▪ Not measurable at current level of design			
8e. Business Impacts: The number and size (based on annual revenue) of existing businesses with impacts from the Broadway improvements that would cause the business to relocate; compared with the number and size (based on annual revenue estimate) of future businesses that could occupy new development on remnant parcels. ▪ Not able to assess at current level of design because potential impacts are not know at enough detail to assess which properties might be impacted.	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts (if extend beyond back of sidewalk) ▪ Not measurable at current level of design			
8f. Job Impacts: Estimated change in number and income of jobs before and after implementation of the Broadway Project. ▪ Not able to assess at current level of planning, because job generation rates are not known, and potential impacts are not know at enough detail to assess which properties might be impacted.	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts (if extend beyond back of sidewalk) ▪ Not measurable at current level of design			
9. Project Cost				
9a. Construction Cost: Total construction cost of planned improvements. ▪ Main design factors are: ○ Cross section width (including intersection design) ○ Use of local access lanes (increased drainage system and lighting costs) ○ Amount of landscaping ○ Number and complexity of signals ○ Extent and type of lighting, landscape, pedestrian, bicycle, and transit facilities	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts			Assessment requires full cross section design

Performance Measure Methodology	Cross Section Elements that Affect Performance Assessment	What Element or Combination of Elements is Assessed		
		Lane Configuration Type	Street Cross Section Elements	Street Cross Section
9b. Acquisition Cost: Total cost of purchasing property, relocation costs, and other costs associated with acquisition of property. ▪ Main design factors are: ○ Cross section width ○ Intersection land area ○ Street alignment	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts			Assessment requires full cross section design
9c. Operations and Maintenance Cost: Total cost of operating and maintaining the improvements. ▪ Pavement and other roadway and sidewalk maintenance. ▪ Signal systems operations and maintenance. ▪ Drainage systems (including water harvesting and green streets) maintenance. ▪ Landscape maintenance and replacement. ▪ Maintenance and replacement of other pedestrian, bicycle, and vehicular improvements. ▪ Transit operations and maintenance are not included	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width			Assessment requires full cross section design
9d. Income for Reuse of Excess City-owned Property: Estimate of value of income from property that is acquired by the City to provide right of way for the Broadway improvements. In some cases this property will have buildings and/or land that can be sold or leased for other use. This performance measure estimates that value of that income. ▪ Factors that have an effect on the estimate of value for lease or land sale of remnant property, include: ○ Amount of remnant land ○ The market potential for and value of the uses that the property can accommodate ▪ Not able to assess impacts from right of way as alignment and intersection design are not determined. ▪ Not able to assess potential for reuse of remnant parcels or revitalization of existing parcels as alignment and intersection design are not determined.	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts (if extend beyond back of sidewalk) ▪ Not measurable at current level of design			
10. Certainty				
10a. Ability to Provide for Changing Transportation Needs: Performance Measure 3f. Accommodation of Future High Capacity Transit measures the ability of Broadway implementation concepts to provide space for potential future changes in the transit service provided along Broadway. Similarly, bicycle, pedestrian, and vehicular demands and needs could change over time. This performance measure allows for assessment of the ability of the Broadway design concepts to adapt to changing transportation demands over time with the goal of minimizing the need for additional right of way and other capital investment. ▪ Factors that affect the ability to meet changing transportation needs include: ○ Presence of transit lanes (or width to accommodate future lanes either within medians or through the conversion of a vehicular lane) ○ Width within the buffer and sidewalk areas to accommodate additional pedestrian, bicycle, and transit features.	▪ Sidewalk width ▪ Buffer width ▪ Vehicle lane number and width ▪ Transit lane presence ▪ Median presence and width	Range for those with dedicated transit lanes based on location of lanes		
10b. Risk of Relying on Future Development for Economic Vitality: Assessment of risk of relying on future revitalization and new development to create positive change in 8. Economic Vitality. ▪ This is related to the rate at which the city can market and transfer remnant property to private interests that will entitle and develop the properties for new uses, and the timing and risk involved for private interests to develop the properties. ▪ While there is risk involved in the ability of remnant properties to be redeveloped, there is the potential that future development could provide both more viable and attractive space for new businesses and residents, as well as more commercial space and more homes compared to existing development on the properties that may be impacted by the future street design. ▪ Factors that affect the risk of future development that can be influenced by the future roadway design, include: ○ The amount of land area for future development ○ The size and configuration of future development sites ○ Access from Broadway to the future development sites	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width ▪ Bus pullouts (if extend beyond back of sidewalk) ▪ Not measurable at current level of design			
10c. Ability of City to Operate and Maintain Improvements: Assessment of relative cost and benefit and ability of city budget to support 9c. Operations and Maintenance Cost. ▪ Factors that affect the ability of the city to support the operations and maintenance of the future roadway are ○ Operations and maintenance costs ○ Ability of the city to fund the costs ▪ The current assessment is expressed as a range given the uncertainty of the city to maintain a consistent level of funding and the relative cost of operations and maintenance for the various lane configurations types and the street cross sections	▪ Sidewalk width ▪ Buffer width ▪ Bicycle lane width ▪ Vehicle and transit lane number and width ▪ Median presence and width	Range		